What is claimed is:

1. A three-dimensional optical cross-connect switch, the switch comprising:

a first optical switching array including a first tile disposed in a first plane and a second tile aligned plane-to-plane with the first tile in a second plane, the first tile including a first collimator array disposed adjacent to a first beam steering array and the second tile including a second collimator array disposed adjacent to a second beam steering array, the first optical switching array being characterized by a first array maximum deflection angle; and

a second optical switching array including a third tile disposed in the first plane and a fourth tile aligned plane-to-plane with the third tile in the second plane, the third tile including a third collimator array disposed adjacent to a third beam steering array, and the fourth tile including a fourth collimator array disposed adjacent to a fourth beam steering array, whereby a switch maximum deflection angle is less than or equal to the first array maximum deflection angle.

2. The switch of claim 1, wherein the first collimator array, the third collimator array, the first beam steering array, and the third beam steering array are arranged in a checker-board pattern.

3. The switch of claim 1, wherein the second collimator array, the fourth collimator array, the second beam steering array, and the fourth beam steering array are arranged in a checker-board pattern.

4. The switch of claim 1 wherein the second optical switching array is characterized by a second array maximum deflection angle.

5. The switch of claim 4, wherein the switch maximum deflection angle is less than or equal to the second array maximum deflection angle.

6. The switch of claim 4, wherein the first array maximum deflection angle is equal to the second array maximum deflection angle.

7. The switch of claim 1, wherein each of the first beam steering array, the second beam steering array, the third beam steering array, and the fourth beam steering array include at least one beam steering pixel.

8. The switch of claim 7, wherein the at least one beam steering panel includes an N x N array of beam steering pixels.

9. The switch of claim 8, further comprising a control system coupled to the beam steering panel, the control system being configured to provide a control signal to each pixel in the N x N array of beam steering pixels.

10. The switch of claim 7, wherein the at least one beam steering pixel includes a MEMS mirror element.

11. The switch of claim 7, wherein the at least one beam steering pixel includes a gimbaled MEMS mirror element having at least two-degrees of beam steering freedom.

12. The switch of claim 7, wherein the at least one beam steering pixel includes a plurality of individually steerable mirror elements.

13. The switch of claim 12, further comprising a control system coupled to the beam steering panel, the control system being configured to provide a control signal to each of the individually steerable mirror elements.

14. The switch of claim 7, wherein each of the first collimator array, the second collimator array, the third collimator array, and the fourth collimator array include at least

one collimator coupled to an optical fiber.

15. The switch of claim 14, wherein the at least one collimator panel includes an N x N array of collimators.

16. The switch of claim 1, wherein the switch is characterized by a z/d ratio greater than ten (10), z being a distance between the first plane and the second plane, and d being a width of a beam steering array.

17. A three-dimensional optical cross-connect switch, the switch comprising:
a first optical switching array including a first tile having a first collimator array disposed adjacent to a first beam steering array and a second tile having a second collimator array disposed adjacent to a second beam steering array, the second collimator array being aligned plane-to-plane with the first beam steering array and the second beam steering array being aligned plane-to-plane with the first collimator array; and
a second optical switching array including a third tile having a third collimator array disposed adjacent to a third beam steering array, and a fourth tile having a fourth collimator array disposed adjacent to a fourth beam steering array, the fourth collimator array being aligned plane-to-plane with the third beam steering array and the fourth beam steering array being aligned plane-to-plane with the third collimator array, whereby the third beam steering array is disposed adjacent the first collimator array.

18. The switch of claim 17, wherein the first collimator array, the third collimator array, the first beam steering array, and the third beam steering array are arranged in a checker-board pattern.

19. The switch of claim 17, wherein the second collimator array, the fourth collimator array, the second beam steering array, and the fourth beam steering array are arranged in a checker-board pattern.

20. The switch of claim 17, wherein the second optical switching array is characterized by a second array maximum deflection angle.

21. The switch of claim 20, wherein the switch maximum deflection angle is less than or equal to the second array maximum deflection angle.

22. The switch of claim 20, wherein the first array maximum deflection angle is equal to the second array maximum deflection angle.

23. The switch of claim 17, wherein the switch is characterized by a z/d ratio greater than ten (10), z being a distance between the first plane and the second plane, and d being a width of a beam steering array.

24. The switch of claim 17, wherein each of the first beam steering array, the second beam steering array, the third beam steering array, and the fourth beam steering array include at least one beam steering pixel.

25. The switch of claim 25, wherein the at least one beam steering panel includes an N x N array of beam steering pixels.

26. The switch of claim 25, wherein the at least one beam steering pixel includes a MEMS mirror element.

27. The switch of claim 25, wherein the at least one beam steering pixel includes a gimbaled MEMS mirror element having at least two-degrees of beam steering freedom.

28. A three-dimensional optical cross-connect switch, the switch comprising: a first optical switching array including a first tile disposed in a first plane and a second tile

disposed in a second plane parallel to the first plane, the first tile including a first collimator array disposed adjacent to a first beam steering array, the second tile having a second collimator array disposed adjacent to a second beam steering array, the first beam steering array and the second beam steering array each having N-steerable pixel elements, the first optical switching array being characterized by an array maximum deflection angle required to access each pixel in the first optical switching array; and

a second optical switching array coupled to the first optical switching array, the second optical switching array including a third tile disposed in the first plane and a fourth tile disposed in the second plane, the third tile including a third collimator array disposed adjacent to a third beam steering array, the fourth tile including a fourth collimator array disposed adjacent to a fourth beam steering array, the third beam steering array and the fourth beam steering array each having N-steerable pixel elements, whereby a switch maximum deflection angle required to access each pixel in the cross-connect switch is less than or equal to the first array maximum deflection angle.

29. The switch of claim 29, wherein the first collimator array, the third collimator array, the first beam steering array, and the third beam steering array are arranged in a checker-board pattern.

30. The switch of claim 29, wherein the second collimator array, the fourth collimator array, the second beam steering array, and the fourth beam steering array are arranged in a checker-board pattern.

31. The switch of claim 29, wherein the second optical switching array is characterized by a second array maximum deflection angle.

32. The switch of claim 32, wherein the switch maximum deflection angle is less than or equal to the second array maximum deflection angle.

33. The switch of claim 32, wherein the first array maximum deflection angle is equal to the second array maximum deflection angle.

34. The switch of claim 29, wherein the switch is characterized by a z/d ratio greater than ten (10), z being a distance between the first plane and the second plane, and d being a width of a beam steering array.

35. The switch of claim 29, wherein each of the first beam steering array, the second beam steering array, the third beam steering array, and the fourth beam steering array include at least one beam steering pixel.

36. The switch of claim 36, wherein the at least one beam steering panel includes an N x N array of beam steering pixels.

37. The switch of claim 36, wherein the at least one beam steering pixel includes a MEMS mirror element.

38. The switch of claim 36, wherein the at least one beam steering pixel includes a gimbaled MEMS mirror element having at least two-degrees of beam steering freedom.

39. A method for expanding a switching capacity of a three-dimensional optical cross-connect switch, the method comprising:

providing a first optical switching array including a first tile disposed in a first plane and a second tile aligned plane-to-plane with the first tile in a second plane, the first tile including a first collimator array disposed adjacent to a first beam steering array and the second tile including a second collimator array disposed adjacent to a second beam steering array, the first optical switching array being characterized by an array maximum deflection angle;

providing a second optical switching array including a third tile disposed in the first plane and a fourth tile aligned plane-to-plane with the third tile in the second plane, the third tile including a third collimator array disposed adjacent to a third beam steering

array, and the fourth tile including a fourth collimator array disposed adjacent to the fourth beam steering array; and

coupling the first optical switching array to the second optical switching array, whereby a maximum deflection angle of the three-dimensional optical cross-connect switch is less than or equal to the array maximum deflection angle.

40. The method of claim 40, wherein the first collimator array, the third collimator array, the first beam steering array, and the third beam steering array are arranged in a checker-board pattern.

41. The method of claim 40, wherein the second collimator array, the fourth collimator array, the second beam steering array, and the fourth beam steering array are arranged in a checker-board pattern.

42. The method of claim 40, wherein the second optical switching array is characterized by a second array maximum deflection angle.

43. The method of claim 44, wherein the method maximum deflection angle is less than or equal to the second array maximum deflection angle.

44. The method of claim 44, wherein the first array maximum deflection angle is equal to the second array maximum deflection angle.

45. The method of claim 40, wherein the method is characterized by a z/d ratio greater than ten (10), z being a distance between the first plane and the second plane, and d being a width of a beam steering array.

46. A method for expanding a switching capacity of a three-dimensional optical cross-connect switch, the method comprising:
providing a first optical switching array including a first tile having a first collimator array disposed adjacent to a first beam steering array and a second tile having a second collimator array disposed adjacent to a second beam steering array, the second collimator array being aligned plane-to-plane with the first beam steering array and the second beam steering array being aligned plane-to-plane with the first collimator array, the first optical switching array being characterized by a first array maximum deflection angle;
providing a second optical switching array including a third tile having a third collimator array disposed adjacent to a third beam steering array, and a fourth tile having a fourth collimator array disposed adjacent to a fourth beam steering array, the fourth collimator array being aligned plane-to-plane with the third beam steering array and the fourth beam steering array being aligned plane-to-plane with the third collimator array, whereby the third beam steering array is disposed adjacent the first collimator array; and
coupling the first optical switching array to the second optical switching array, whereby a maximum deflection angle of the three-dimensional optical cross-connect switch is less than or equal to the array maximum deflection angle.

47. A method for switching optical signals in a three-dimensional optical cross-connect switch, the switch including a first optical switching array including a first tile disposed in a first plane and a second tile aligned plane-to-plane with the first tile in a second plane, the first tile including a first collimator array disposed adjacent to a first beam steering array and the second tile including a second collimator array disposed adjacent to a second beam steering array, the first optical switching array being characterized by an array maximum deflection angle, the method comprising:

providing a second optical switching array including a third tile disposed in the first plane and a fourth tile aligned plane-to-plane with the third tile in the second plane, the third tile including a third collimator array disposed adjacent to a third beam steering array, and the fourth tile including a fourth collimator array disposed adjacent to the fourth beam steering array;

coupling the first optical switching array to the second optical switching array,

whereby a maximum deflection angle of the three-dimensional optical cross-connect switch is less than or equal to the array maximum deflection angle; and

directing the light signal into the first collimator array, whereby the light signal propagates toward the second plane.

48. The method of claim 48, wherein the second beam steering array reflects the light signal toward the first plane.

49. The method of claim 49, wherein the first beam steering array directs the light signal to an output port via the second collimator array.

50. The method of claim 49, wherein the first beam steering array directs the light signal to an output port via the fourth collimator array.

51. The method of claim 48, wherein the fourth beam steering array reflects the light signal toward the first plane.

52. The method of claim 52, wherein the first beam steering array directs the light signal to an output port via the second collimator array.

53. The method of claim 52, wherein the first beam steering array directs the light signal to an output port via the fourth collimator array.